
Tumorigenicity as a clinical hurdle for pluripotent stem cell therapies.

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Public Summary:

Human pluripotent stem cells (PSCs) are a type of cell that can generate various types of tissues as well as copies of themselves (through self-renewal). Thus, these cells are a leading candidate for cell-based therapies, where they might be used to replace diseased or damaged tissue. In fact, recent advances have culminated in the first-in-human clinical trials of PSCs by Geron, Advanced Cell Technology, and the Kobe Center for Developmental Biology. These groups are testing PSCs for the treatment of spinal cord injury and macular degeneration (a cause of loss of vision). Despite the therapeutic promise of PSC, a crucial hurdle for their clinical use is their potential to form tumors when they are placed in the body. In this Perspective, we present an overview of the mechanisms by which human PSC-based therapies may cause tumors, and we discuss current advances in addressing this challenge.

Scientific Abstract:

Human pluripotent stem cells (PSCs) are a leading candidate for cell-based therapies because of their capacity for unlimited self renewal and pluripotent differentiation. These advances have recently culminated in the first-in-human PSC clinical trials by Geron, Advanced Cell Technology and the Kobe Center for Developmental Biology for the treatment of spinal cord injury and macular degeneration. Despite their therapeutic promise, a crucial hurdle for the clinical implementation of human PSCs is their potential to form tumors in vivo. In this Perspective, we present an overview of the mechanisms underlying the tumorigenic risk of human PSC-based therapies and discuss current advances in addressing these challenges.

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